

MEDICATION SAFETY ALERT**REDUCING RISK OF OVERDOSE WITH MIDAZOLAM****KEY POINTS**

- Availability of multiple strengths and volumes of midazolam increases the risk of error.
- Dosages of midazolam need to be titrated to patient's clinical needs.
- Prescriptions should clearly state the dosage in milligrams and route of administration.
- Syringes should always be labelled with the drug name and concentration (mg/mL).

RECOMMENDED ACTION BY HEALTH SERVICES

Healthcare services should ensure that:

- The storage and use of the various strengths of midazolam is rationalised based on indications for use within each clinical area.
- Local midazolam dosing guidelines are readily available.
- All preparations of midazolam in syringes are clearly labelled.
- Midazolam orders always include the route of administration and the number of milligrams required with a special note made for off-label use. Unusual doses or route of administration are confirmed with prescribers.
- Flumazenil is available where midazolam is used but that this is reserved for reversal of over sedation.
- The use of flumazenil is regularly audited as a marker of excessive dosing of midazolam.

BACKGROUND

A Rapid Response Report from the NHS National Patient Safety Agency (NPSA)¹ raised issues related to the risk of overdose with midazolam injection noting:

- Overdoses caused by confusion between the various strengths and volumes of midazolam preparations available,
- Overdoses resulting from failure to titrate the dose to the patient's clinical needs, and
- Frequent reliance on injectable flumazenil (antagonist/reversing agent) for reversal of sedation.

This prompted WAMSG to examine whether similar issues are of concern in WA by looking at what preparations of midazolam are in use in WA health services, and examining midazolam and flumazenil related incidents notified to the Advanced Incident Management System (AIMS) and Sentinel Event databases.

Indications for midazolam

Midazolam is used in four settings with the mode of administration dependent on the indication:

- Conscious sedation prior to diagnostic or surgical intervention, administered intravenously by bolus dose,
- Continuous sedation in a critical care setting, administered through an intravenous infusion, and
- Chemical restraint, administered intravenously by bolus dose, although this may sometimes be administered intramuscularly.
- Status epilepticus/intractable seizures, administered intravenously by bolus or infusion.

Midazolam 5 mg/mL in 1 mL plastic ampoules is prescribed and used, particularly in paediatrics, for seizures lasting longer than 3 to 5 minutes via buccal or intranasal route (non-approved off-label use).

Availability of various concentration in WA health services

Midazolam is available as an injectable preparation in strengths of 5 mg/mL and 1 mg/mL. The higher strength is available in three volumes; 10 mL (50 mg), 3 mL (15 mg) and 1 mL (5 mg) and the lower strength in 5 mL (5 mg). Both strengths were available in most clinical areas. Larger volumes were generally found in high dependency areas of larger hospitals. Most wards and theatre suites stock 5 mg/1 mL and 5 mg/5 mL.

¹ Reducing risk of overdose with midazolam injection in adults, NHS National Patient Safety Agency, December 2008 <http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=59896>

Adverse Events Associated with Midazolam in Western Australia

Clinical incidents associated with midazolam identified similar issues to those raised in the NPSA Rapid Response Report. Given the frequency and severity of these reported incidents, WAMSG resolved to issue this alert.

FURTHER READING

Reducing risk of overdose with midazolam injection in adults, NHS National Patient Safety Agency, December 2008 <http://www.nrls.npsa.nhs.uk/resources/type/alerts/?entryid45=59896>

Sedation of Acutely Agitated Adult Patients Prior to Transportation, WATAG, January 2006.
http://www.watag.org.au/wapdc/docs/Sedation_Guide_Jan06.pdf

Pharmacological Management of Acutely Aroused Adult Patients, WATAG, March 2007.
http://www.watag.org.au/wapdc/docs/Acute_Arousal_Guide_March07.pdf

NSWTAG Parenteral Medicines, Fluids and Lines: Labelling Recommendations

[http://www.health.gov.au/internet/safety/publishing.nsf/Content/com-pubs_NIMC-con/\\$File/31170-Parenteral-Labeling-Recommendations.PDF](http://www.health.gov.au/internet/safety/publishing.nsf/Content/com-pubs_NIMC-con/$File/31170-Parenteral-Labeling-Recommendations.PDF)

FURTHER INFORMATION

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